REMARKS

I. Introduction

In response to the Office Action dated April 4, 2006, claims **1, 10, 11, 12, 23, 33, 34, 43,** and **44** have been amended. Claims 1, 3-7, 10-12, 14-18, 21-23, 25-29, 31-34, 36-40, and 43-44 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Request for Information

In response to the request for information, Applicants submit the enclosed references that discuss Stone Disk Arrays v. 1. Applicants submit that this response is fully compliant with the request for information.

III. Objections re claims 10 and 43

Applicants have amended the claims to make the deletions more clear and submit that the objection is now moot.

IV. Objections to the Abstract

Applicants have amended the Abstract in accordance with the suggestions of the Examiner and submit that the rejection is now moot.

V. Non-Art Rejections

In paragraphs (22)-(24) of the Office Action, claims 1, 3-7, 10-12, 14-18, 21-23, 25-29, 32-34, 36-40, 43, and 44 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

Applicants have amended the independent claims consistent with support in the specification (see paragraphs 39 and 45-47). Accordingly, Applicants submit that these rejections are now moot.

In paragraphs (26)-(28) of the Office Action, claims 1, 3-7, 10-12, 14-18, 21-23, 25-29, 32, and 33 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants have amended the independent claims to provide clarity and submit that the rejections are now moot.

In paragraph (27) of the Office Action, claims 11, 33, and 44 were rejected for being dependent on cancelled claims. Applicants have amended the claims and submit that the rejections are now moot.

VI. Prior Art Rejections

In paragraphs (29)-(30) of the Office Action, claims 1, 3, 5-7, 10-12, 14, 16-18, 21-23, 25, 27-29, 32-34, 36, 38-40, 43, and 44 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bopardikar et al. (Bopardikar), U.S. Patent No. 6,404,975, in view of Stoppani, Jr., U.S. Patent No. 5,287,500, and further in view of William Stallings, "Operating Systems Internals and Design Principles".

Specifically, claims 1, 12, 23, and 34, were rejected as follows:

> As to claim 1, Bopardikar discloses a data processing apparatus, comprising:
>
> (a) data storage means comprising a RAID (Col. 3, lines 55-65) having a plurality of defined storage elements, wherein each of said defined storage elements comprises a separate partition on the RAID, with each separate partition configured to accept image data relating to image frames of a predetermined frame definition/size (Col. 5, lines 22-50).
>
> Bopardikar does not disclose expressly, the data processing apparatus comprising:
>
> (b) memory means containing multiple datastores and usage data for each of the multiple datastores, said usage data indicating which of said defined storage elements contains image data of the predetermined frame definition/size; and
>
> (c) processing means configured to:
>
> (i) update said usage data in each of said datastores in response to image data being stored within said data storage means;
>
> (ii) analyse said usage data to determine the number of said storage elements not containing image data;
>
> (iii) store information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition and indicating said number of storage elements in each separate partition not containing image data; and
>
> (iv) read the information from said datastore to determine whether further data may be stored.
>
> Stoppani discloses a memory means (Fig. 1, item 112, col. 2, lines 30-31: Primary memory) containing multiple datastores (Fig. 6, Combination of Items 240, 244, 246; Col. 6, lines 25-58: Each entry in the free space table is a datastore) and a plurality of disks containing usage data, the usage data indicating the clusters of a predetermined size that do or do not contain data (Fig. 6, Item 232; Col. 6, lines 19-24); and a processing means (Fig. 1, Item 124) configured to update said usage data in each of said datastores in response data being stored within said data storage means (col. 6, lines 19-24); analyse said usage data to determine the number of said storage elements not containing data (col. 6, lines 35-43); store information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition (Col. 6, lines 25-28) and indicating

said number of storage elements in each separate partition not containing data (Col. 6; lines 38-43); and read the information from said datastore to determine whether further data may be stored (Fig. 4, Step 186; Col. 6, lines 44-47).

Bopardikar and Stoppani are analogous art because they are from the similar problem solving area of efficiently allocating storage space in a storage device.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art, having the teachings of Bopardikar and Stoppani before them, to use the free space determination method of Stoppani with the image storage system of Bopardikar.

The motivation for doing so would have been to allow for faster allocation of storage space (Stoppani: Col. 1, lines 40-52; Col. 7, lines 2-5).

Therefore, it would have been obvious to combine Stoppani with Bopardikar to obtain the invention as specified in claim 1.

The combination of Bopardikar and Stoppani does not disclose expressly wherein the memory means contains the usage data.

Stallings discloses wherein the usage data is stored in the memory and not the disk (pg. 549-550).

The combination of Bopardikar and Stoppani and Stallings are analogous art because they are from the same field of endeavor of managing storage space on a storage device.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art, having the teachings of the combination of Bopardikar and Stoppani and Stallings before them, to store the usage data in the memory means rather than the data storage means.

The motivation for doing so would have been the ability to search for free space without the need for disk access (Stallings: pgs. 549-550).

As to claim 12, Bopardikar discloses a data processing system, comprising RAID data storage means (Col. 3, lines 55-65) having a plurality of defined storage elements, a method of storing data, comprising the steps of:

storing image frames in the RAID data storage means, said RAID data storage means having a plurality of defined storage elements, wherein each of said defined storage elements comprises a separate partition on the RAID, with each separate partition configured to accept image data relating to image frames of a predetermined frame definition/size (Col. 5, lines 22-50).

Bopardikar does not disclose expressly, the data processing system comprising processing means and memory means having multiple datastores and the method further comprising the steps of:

storing usage data for each of the multiple datastores within said memory means, said usage data indicating which of said defined storage elements for each partition contains image data of the predetermined frame definition/size; and

analyzing said usage data to determine the number of said storage elements not containing image data;

storing information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition and indicating said number of storage elements in each separate partition not containing image data; and

read the information from said datastore to determine whether further data may be stored.

Stoppani discloses a memory means (Fig. 1, Item 112; Col. 2, lines 30-31: Primary memory) containing multiple datastores (Fig. 6, Combination of Items 240, 244, 246; Col. 6, lines 25-28; Each entry in the free space table is a datastore) and a plurality of disks containing usage data, the usage data indicating the clusters of a predetermined size that do or do not contain data (Fig. 6, Item 232; Col. 6, lines 19-24); and a processing means (Fig. 1, Item 124) configured to update said usage data in each of said datastores in response data being stored within said data storage means (Col. 6, lines 19-24); analyse said usage data to determine the number of said storage elements not containing data (Col. 6, lines 35-43); store information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition (col. 6, lines 25-28) and indicating said number of storage elements in each separate partition (Col. 6, lines 38-43); and read the information

from said datastore to determine whether further data may be stored (Fig. 4, Step 186; Col. 6, lines 44-47).

Bopardikar and Stoppani are analogous art because they are from the similar problem solving area of efficiently allocating storage space in a storage device.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art, having the teachings of Bopardikar and Stoppani before them, to use the free space determination method of Stoppani with the image storage system of Bopardikar.

The motivation for doing so would have been to allow for faster allocation of storage space (Stoppani: Col. 1, lines 40-52; Col. 7, liens 2-5).

Therefore, it would have been obvious to combine Stoppani with Bopardikar to obtain the invention as specified in claim 12.

The combination of Bopardikar and Stoppani does not disclose expressly wherein the memory means contains the usage data.

Stallings discloses wherein the usage data is stored in the memory and not the disk (pg. 549-550).

The combination of Bopardikar and Stoppani and Stallings are analogous art because they are from the same field of endeavor of managing storage space on a storage device.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of the combination of Bopardikar and Stoppani and Stallings before them, to store the usage data in the memory means rather than the data storage means.

The motivation for doing so would have been the ability to search for free space without the need for disk access (Stallings: pgs. 549-550).

Therefore, it would have been obvious to combine Stallings with the combination of Bopardikar and Stoppani to obtain the invention as specified in claim 12.

As to claim 23, Bopardikar discloses a computer-readable medium having computer-readable instructions executable by a computer such that, when executing said instructions, a computer will perform the steps of:

storing data within data storage means comprising a RAID (Col. 3, lines 55-65) having a plurality of defined storage elements, wherein each of said defined storage elements comprises a separate partition on the RAID, with each separate partition configured to accept image data relating to image frames of a predetermined frame definition/size (Col. 5, lines 22-50).

Bopardikar does not disclose expressly, the computer performing the steps of:

storing usage data in multiple datastores, said usage data indicating which of said storage elements is currently being used in the predetermined frame/definition size;

in response to data being stored within said data storage means, updated said usage data in each of the multiple datastores;

analyzing said usage data to determine the number of said storage elements not containing image data;

storing information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition and indicating said number of storage elements in each separate partition not containing image data; and

reading said information from said datastore to determine whether further image data may be stored.

Stoppani discloses a memory means (Fig. 1, Item 112; Col. 2, lines 30-31: Primary memory) containing multiple datastores (Fig. 6, Combination of Items 240, 244, 246; Col. 6, lines 25-28: Each entry in the free space table is a datastore) and a plurality of disks containing usage data, the usage data indicating the clusters of a predetermined size that do or do not contain data (Fig. 1, Item 124) configured to update said usage data in each of said datastores in response data being stored within said data storage means (Col. 6, lines 19-24); analyse said usage data to determine the number of said storage elements not containing data (Col. 6, lines 35-43); store information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition (Col. 6, lines 25-38) and indicating said number of storage elements in each separate partition

not containing data (Col. 6; lines 380-43); and read the information from said datastore to determine whether further data may be stored (Fig. 4, Step 186; Col. 6, lines 44-47).

Bopardikar and Stoppani are analogous art because they are from the similar problem solving area of efficiently allocating storage space in a storage device.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Bopardikar and Stoppani before them, to use the free space determination method of Stoppani with the image storage system of Bopardikar.

The motivation for doing so would have been to allow for faster allocation of storage space (Stoppani: Col. 1, lines 40-52; Col. 7, lines 2-5).

Therefore, it would have been obvious to combine Stoppani with Bopardikar to obtain the invention as specified in claim 23.

The combination of Bopardikar and Stoppani does not disclose expressly wherein the memory means contains the usage data.

Stallings discloses wherein the usage data is stored in the memory and not the disk (pg. 549-550).

The combination of Bopardikar and Stoppani and Stallings are analogous art because they are from the same field of endeavor of managing storage space on a storage device.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of the combination of Bopardikar and Stoppani and Stallings before them, to store the usage data in the memory means rather than the data storage means.

The motivation for doing so would have been the ability to search for free space without he need for disk access (Stallings: pgs. 549-550).

Therefore, it would have been obvious to combine Stallings with the combination of Bopardikar and Stoppani to obtain the invention as specified in claim 23.

As in claim 34, Bopardikar discloses a computer system programmed to execute stored instructions such that in response to said stored instructions said system is configured to:

store data within data storage means comprising a RAID (Col. 3, lines 55-65) having a plurality of defined storage elements, wherein each of said defined storage elements comprises a separate partition on the RAID, with each separate partition configured to accept image data relating to image frames of a predetermined frame definition/size (Col. 5, lines 22-50).

Bopardikar does not disclose expressly, the system configured to:

store usage data in multiple datastores, said usage data indicating which of said storage elements contains image data in the predetermined frame/definition size;

in response to data being stored within said data storage means, update said usage data in each of the multiple datastores;

analyse said usage data to determine the number of said storage elements not containing image data;

store information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition and indicating said number of storage elements in each separate partition not containing image data; and

read said information from said datastore to determine whether further image data may be stored.

Stoppani discloses a memory means (Fig. 1, Item 112; Col. 2, lines 30-31: Primary memory) containing multiple datastores (Fig. 6, Combination of Items 240, 244, 246; Col. 6, lines 25-28: Each entry in the free space table is a datastore) and a plurality of disks containing usage data, the usage data indicating the clusters of a predetermined size that do or do not contain data (Fig. 6, Item 232; Col. 6, lines 19-24); and a processing means (Fig. 1, Item 124) configured to update said usage data in each of said datastores in response data being stored within said data storage means (Col. 6, lines 19-24); analyse said usage data to determine the number of said storage elements not containing data (Col. 6, lines 35-43); store information within each of said datastores, said information identifying the predetermined frame definition/size for each separate partition (Col. 6, lines 25-28) and indicating said number of storage elements in each separate partition not containing data (Col. 6; lines 38043);

and read the information from said datastore to determine whether further data may be stored (Fig. 4, Step 186; Col. 6, lines 44-47).

Bopardikar and Stoppani are analogous art because they are from the similar problem solving area of efficiently allocating storage space in a storage device.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Bopardikar and Stoppani before them, to use the free space determination method of Stoppani with the image storage system of Bopardikar.

The motivation for doing so would have been to allow for faster allocation of storage space (Stoppani: Col. 1, lines 40-52; Col. 7, lines 2-5).

Therefore, it would have been obvious to combine Stoppani with Bopardikar to obtain the invention as specified in claim34.

The combination of Bopardikar and Stoppani does not disclose expressly wherein the memory means contains the usage data.

Stallings discloses wherein the usage data is stored in the memory and not the disk (pg. 549-550).

The combination of Bopardikar and Stoppani and Stallings are analogous art because they are from the same field of endeavor of managing storage space on a storage device.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of the combination of Bopardikar an Stoppani and Stallings before them, to store the usage data in the memory means rather than the data storage means.

The motivation for doing so would have been the ability to search for free space without the need for disk access (Stallings: pgs. 549-550).

Therefore, it would have been obvious to combine Stallings with the combination of Bopardikar and Stoppani to obtain the invention as specified in claim 34.

Applicant traverses the above rejections. Namely, the unique combination of the claim elements provides significant advantages and distinguishable differences from that of the cited prior art.

Independent claims 1, 12, 23, and 34 are generally directed to a method for determining the amount of free storage space in a RAID system. Namely, a RAID system has a plurality of partitions and each partition has a plurality of defined storage elements. Each partition/storage element accepts image data for image frames of a predetermined frame definition/size. The issue arises as to determining whether sufficient space exists in a particular partition to store a clip or frame data. To provide such capabilities, the invention utilizes memory that is configured to store usage data and a summary of the usage data. The usage data indicates which defined storage element/partition contains image data of the predetermined frame definition/size. The usage data is updated whenever image data is stored in the RAID system. In response to the updating of the usage data, datastores (that contain a summary of such usage data) are updated. The usage data is analyzed to determine the number of storage elements not containing image data (i.e., for each partition/predetermined frame definition/size). Information (gathered as a result of the analysis of

the usage data) is then stored in each of the datastores. Such stored information identifies the predetermined frame definition/size for each partition, and indicates the number of storage elements in each separate partition that does not contain image data. The information in the datstore may then be read to determine if further image data can be stored in the RAID system.

The amended claims provide a unique combination and a specific manner for utilizing the cache and datastores and the summary information in a RAID system. The Action relies on Bopardikar to teach a RAID system. Applicants note that while Bopardikar describes the use of a RAID system, the manner in which the cache and the information is summarized into the cache is not taught, disclosed, or remotely alluded to in Bopardikar. Specifically, Bopardikar fails to illustrate information that not only identifies a predetermined frame definition/size for each partition in the RAID system, but also indicates the number of free storage elements in each separate partition. In fact, the Office Action admits Bopardikar's lack of teaching in this area.

In rejecting the multiple cache aspects of the prior claims, the Office Action combines Stoppani, Stallings, and Bopardikar. Namely, the Office Action relies on both Stoppani and Stallings for allegedly teaching a plurality of caches. However, as claimed the plurality of datastores reflect specific pieces of information that is not taught by the prior art cited. For example, neither Stoppani nor Stallings mention a RAID system or different partitions. Accordingly, it would be impossible for information to be stored in the cache that identifies such a predetermined frame definition/size for each separate partition.

The Office Action responds to this prior argument by asserting that since a partition can be viewed as a separate disk and Stoppani discloses the use of a disk having its own bitmap, the combination of Stoppani and Bopardikar disclose using a separate cache for storing usage information for different "partitions" in a RAID. Applicants respectfully disagree and traverse such an assertion. Namely, Stoppani is not even utilized in the image frame environment. Further, the concept of using different partitions in such a manner is not even remotely hinted at or contemplated in Stoppani. Thus, there is no motivation to combine Stoppani with Bopardikar. Further, without even remotely pondering the concept of partitions, Stoppani cannot possibly disclose the usage data or a summary of such usage data based on a frame definition/size for each partition.

In addition, rather than describing such a predetermined size and a number of free spaces in such a size, Stoppani merely describe a number of free clusters that remains on a device (see col. 6, lines 38-43). Such a teaching completely fails to describe the identification of a particular predetermined frame definition/size for each partition or how many free clusters remain in such a partition (as claimed). Again, the text of Stoppani fails to not only describe the different partitions and sizes allocated amongst partitions, but also fails to teach the summarization of data based on the information within the partitions.

Stallings further fails to cure Stoppani's deficiencies. Similar to Stoppani, Stalling merely describes a file system that uses bit tables to maintain auxiliary data structures that summarize the contents of subranges of the bit table. The table is divided into a number of equal-size subranges and for each subrange, the table provides the number of free blocks and the maximum size contiguous number of free blocks. Stallings system further requires a scan of the table to find an appropriate subrange and a search of the subrange. Such a teaching completely fails to provide for multiple bit tables and the summary of multiple bit tables that are stored in memory. The present claims provide for multiple datastores having usage data (with the dependent claims identifying each usage data as consisting of a bitmap). In this regard, Stallings summary table is not even close to that set forth in the present claims.

The Office Action may attempt to assert that the Applicant cannot attack the references individually. However, while Applicants agree that one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references, the claimed invention must also be examined as a whole and whether the "whole" claimed invention would have been obvious at the time of invention (see MPEP §2142). When examining the present whole invention, it is clear that the prior art fails to teach, disclose, or suggest the use of a RAID system with multiple partitions in combination with a datastore to indicate not only the predetermined frame definition/size for each partition, but the number of storage elements in each separate partition that does not contain image data.

In addition to the above, the amended claims provide for flushing the data stores in response to the updating of the usage data. The present specification describes various problems with the prior art including the time taken to parse the usage data bitmap. The problem arises as to how to ensure the information in the datastore remains current and valid so that it may be

appropriately used. The presently claimed invention addresses this problem by flushing the information from the datastores whenever the usage data is updated. Stoppani fails to describe how or when the records 242 are updated. In fact, Stoppani actually teaches away from such a limitations since the record contains pointers to the linked list. If such records are cleared or flushed, the links would be lost and Stoppani's implementation would be unusable.

In view of the above, Applicants submit that neither the cited references alone, nor the combination of the cited references would result in the present invention. Specifically, the combination would not teach the flushing of datastores or the ability to summarize the multiple caches and providing the predetermined frame definition/size for each partition along with the number of storage elements as claimed. Instead, the RAID system of Bopardikar would be combined with a system that indicates an overall number of free blocks. Such a system would not summarize the data on a per/partition per/predetermined frame definition/size basis or flush a summary of usage data as claimed.

Moreover, the various elements of Applicants' claimed invention together provide operational advantages over Stoppani, Stallings, MSCD, and Bopardikar. In addition, Applicants' invention solves problems not recognized by Stoppani, Stallings, MSCD, and Bopardikar.

Thus, Applicants submit that independent claims 1, 12, 23, and 34 are allowable over Stoppani, Stallings, MSCD, and Bopardikar. Further, the dependent claims are submitted to be allowable over Stoppani, Stallings, MSCD, and Bopardikar in the same manner, because they are dependent on independent claims 1, 12, 23, and 34, respectively, and thus contain all the limitations of the independent claims. In addition, the dependent claims recite additional novel elements not shown by Stoppani, Stallings, MSCD, and Bopardikar.

VII. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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